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ABSTRACT

This research study was designed to assess preservice elementary education teachers' knowledge of world geography. The "High School Subject Tests: World Geography," developed by Scott, Foresman and Company for use with high school students, was administered to 124 undergraduate elementary education majors enrolled in social studies methods courses at a southern university. Consisting of 45 multiple-choice items, the test was subdivided into the following six content areas: basic geographic definitions; chronology and seasonal change; determining direction, distance, and elevation; location determination; identifying landforms; and map reading. Overall, the students performed poorly on this test, and it is concluded that these prospective teachers will have difficulty teaching geography to elementary students unless they learn on the job. A study by Breazeale (1985) provides some evidence that teachers do learn on the job. However, improvement in place location knowledge will require a change of teacher attitude toward world events, recognizing the importance of world geography, history, and the other social sciences. Student performance was evaluated and presented in eight tables detailing the percentage of correct responses by content area. A nine-item bibliography is included. (GEA)

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Preservice Elementary Education Majors' Knowledge of World Geography

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Running head: GEOGRAPHY

SO 019 803

Abstract

One hundred twenty-four university undergraduates were administered a standardized test to estimate their knowledge of world geography. Overall, the students performed poorly on the content that they will be expected to teach. The students appeared to have the most difficulty identifying landforms, place location, and type of map projection. They encountered the least difficulty in recognizing the shape of the state of Louisiana, identifying a population density map, and using longitude and latitude.

Preservice Elementary Education Majors' Knowledge of World Geography

Woodring (1984) states that geography qualifies for basic education because it is "basic preparation for living in, understanding and moving about in today's world." He states that geography can provide a knowledge of the surface of the world (continents, islands, lakes, rivers, mountains, deserts, and political boundries). It provides a knowledge of the distribution of plants, animals, and human beings. Familiarity with ocean currents and the atmosphere shows how some regions are more livable than others. This knowledge is basic to the study of the social sciences and other diciplines, such as biology, geology, and literature. It is needed by all people, those who plan to attend college as well as those who do not. It is needed for understanding newspapers, news broadcasts and weather reports, enjoying travel, and reading maps.

Several studies have examined preservice teachers' knowledge of geography. Most of these studies have focused on place location rather than on a broad view of geography. Ehrich (1960) administered a test to 52 undergraduates enrolled in a sociology-anthropology class at Brooklyn College. The sample included students and student teachers majoring in early childhood, elementary, and high school education. Unfortunately, findings were not reported along these divisions. Students were asked to

locate major rivers, lakes, mountain ranges, large cities, and the 48 states. The average number of misses on the states was 19 for the general section of students and 21 1/2 for the student teachers. Some examples of the kind of errors made are illustrative of the problem. North and South Carolina appeared in Kansas and Nebraska, while one student labeled Long Island as Rhode Island.

Herman, Hawkins, and Berryman (1985) asked 282 preservice teachers (254 elementary majors and 28 secondary majors) to locate on a world outline map 10 countries deemed newsworthy. Two-thirds or more of the elementary majors incorrectly located 8 of the 10 countries (India and Mexico were the two exceptions). Secondary majors performed much better. Secondary majors had trouble locating Angola (21% correct), Venezuela (43% correct), and Vietnam (54% correct).

Larkins, Hawkins, and McKinney (1984) developed two tests--one on content covered in three elementary social studies textbooks and one on content that the researchers believed that elementary teachers should know. Only sample test items, such as the location of the Great Plains and Andes Mountains, were provided. The authors concluded that on the geography portion, 48% of the students would have percentage grades of Ds or Fs. More information was reported concerning the place location of 15 states. Based on a random sample of 35 of the 164 students, only five states were correctly located by 50% of the subsample.

Furthermore, some of the mistakes were grotesque. Alaska was placed on Maine; Oregon was located at Wisconsin and Iowa; and New Mexico became Hawaii.

Larkins, Hawkins, and McKinney (1985) attempted to replicate their 1984 findings. Elementary education majors at two universities (n=168 and 70) participated. Similar instruments were administered. Place location improved dramatically from the 1984 sample primarily because the test format was changed from labeling an outline map to multiple choice. Still, only 20% of the sample could correctly locate Indiana. Over 50% of the sample were able to identify the remaining 14 states.

Schneider (1976) administered a 69-item test developed by A. J. Nystrom and Company to 32 seniors majoring in elementary education, 60 school teachers enrolled in a M.Ed. program, and 371 sixth-grade students. No differences were found between the experienced and inservice teachers ($\bar{X}$=53.11 for all). Although the sixth-grade students scored lower than the teachers, Schneider reported that both sixth graders and teachers had similar problems. Teachers had problems with selecting appropriate synonyms for the terms globe, latitude, and longitude; locating the mouth and source of rivers; determining the direction of river flow on a contour map; determining the cause of seasonal change; and comparing climates of cities on the basis of differences in latitude and elevation.

Giannangelo and Frazee (1977) administered the map skills

section of the Iowa Test of Basic Skills to 390 elementary educators. The sample included teachers, administrators, and supervisors. They reported the areas of greatest strength were the ability to visualize landscape features and the ability to locate or describe places on maps and globes through the use of a key. The major weaknesses involved the ability to determine distances on road maps and the ability to determine distances on a globe. Of the 16 skills tested, eight were missed more than 40% of the time. These eight skills were determining direction from parallels and meridians; determining direction of river flow or slope of the land; locating and/or describing places on a map through latitude and longitude; determining distances on road maps; using scale; determining distances on a globe; understanding seasonal variations, sun pattern, and time differences; and reading and comparing facts from one or more maps.

The study reported here is one of a series of studies on preservice teachers' knowledge of four social science content areas. This study examined knowledge of world geography.

Procedure

Sample

The sample consisted of 124 undergraduate elementary education majors enrolled in a medium-size university located in a southern state. The sample was composed predominantly of white females. All students were enrolled in one of six sections of a social studies methods course. Prior to enrolling in this methods

class, the students should have completed the university's core requirements which included 12 semester hours of social science electives.

The test was administered individually or in small groups of two to five students during periods of free time. Points toward course grade were given to the students.

Instrument

The instrument used to measure students' geographic knowledge was the High-School Subject Tests: World Geography, published by Scott, Foresman and Company. The test, as its name states, was designed for use with high school students. Reliability and validity data are available for samples of high-school age subjects (Gatta, 1980).

The test consists of 45 multiple-choice items, each with four choices. The test is subdivided into six content areas. The content areas are (a) Basic Definitions (5 items); (b) Chronology and Seasonal Change (12 items); (c) Determining Direction, Distance, and Elevation (6 items); (d) Determining Location (6 items); (e) Identifying Landforms (5 items); and (f) Map Reading (11 items).

Although we question the classification of some of the items, (for instance, we would classify some of the map-reading items as place location), we would not question that the test should be easy for juniors and seniors at a university. For example, the test was administered to the 12-year-old daughter of two of the

researchers. She responded correctly to 35 of the items, for a score of 78%.

Results

The range of correct responses on the test is presented in Table 1. Scores ranged from 10 to 40 correct responses. The mean and standard deviation were 26.9597 and 6.4004 respectively. Fifty percent of the students made a raw score of 27 or less. Sixty-eight percent of the students made the equivalent of a D (less than 70% correct) or less on the test. Another way to put these data into perspective is to compare the university juniors and seniors with the 12-year-old girl. The girl made a percentage score of 78. Only nine of the 124 university students scored higher than this. The number and percentage of correct responses by item are presented in Table 2.

Insert Tables 1 and 2 about here

The number of correct responses to the five definitions tested is presented in Table 3. The five definitions are geography, time (revolution), leap year, savanna, and tundra. The last two, savanna and tundra, are related to the types of vegetation that one would find in these regions. Students had the most difficulty with savanna and tundra. Only 39% and 53% of the students responded correctly to these two items, while 74%, 87%, and 92% responded correctly to the first three items.

Insert Table 3 about here

Correct responses to the 12 items that measure knowledge of chronology and seasonal change are presented in Table 4. The 12 items contain (a) name of the century for a given year, (b) relationship of revolution to one year, (c) clock, (d) A.D., (e) International Date Line, (f) time zones, (g) earth/sun relationship, (h) rotation (two items), (i) calendars, (j) time line, and (k) direction of sun's rays. Over one-third of the students missed one-half of these items. The students had the most difficulty with items related to the International Date Line (36% correct), the earth's rotation (two items--48% correct and 55% correct), and the angle of the sun's rays (41% correct). The students' best performance was on items related to clocks (78% correct) and time lines (76% correct).

Insert Table 4 about here

Correct responses to the six items that measure the ability to determine direction, distance, and elevation are presented in Table 5. Three items are related to the use of a compass rose, while three items measure the ability to use scale, a distance (mileage) chart, and an elevation map. Students had the most difficulty with the item related to measuring distances using

scale. Forty-two percent of the students missed this item. On the other hand, 81% of the students responded correctly to the item that required them to use a mileage chart to determine the distance between two cities. Over two-thirds of the students responded correctly to the items that required the use of a compass rose to determine cardinal and intermediate directions.

Insert Table 5 about here

The percentage of correct responses to the six items related to determining location are presented in Table 6. Three items appear to be definitional in nature. These items are concerned with defining and identifying lines of latitude and longitude. The remaining three items are related to using longitude and latitude. That lines of latitude did not measure east or west of the equator proved to be the most difficult item. Only 45% of the students responded correctly to this item. However, 67% of the students responded correctly to a similar item related to lines of longitude. Eighty-nine percent of the students were able to differentiate between lines of latitude and lines of longitude on a map. Eighty-four percent of the students were able to identify that the continent of Africa fell between the given coordinates. However, 49% of the students could not identify Italy as the country through which the 40th parallel passed. Perhaps this item measures place location more than the ability to use lines of

latitude.

Insert Table 6 about here

Five items are related to determining landforms. The number of correct responses to these items is presented in Table 7. The landforms are isthmus, gulf, delta, peninsula, and oasis. These were among the most difficult items on the test. Only 20% of the students were able to identify an isthmus, 34% were able to identify a gulf, 23% were able to identify a delta, 58% were able to identify a peninsula, and 61% were able to identify an oasis.

Insert Table 7 about here

Eleven items are related to map reading. The results are presented in Table 8. We should point out that we question whether many of these items should be classified as "map reading." The content of the 11 items is identification of type of map projection, time zones, identification of Egypt on the African continent, identification of the Sahara, identification of the Mediterranean Sea, identification of Lebanon, identification of the shape of the state of Louisiana, recognition of a population density map, and three items related to the use of a road map. The most difficult item requires that the students identify the type of map projection used (interrupted). Only 20% of the

students responded correctly to this item. The second most difficult item requires the students to be able to recognize the country of Lebanon. Twenty-eight percent of the students responded correctly to this item. Only 33% of the students could correctly identify the continent of Africa. In order to respond correctly to this item, the students had to recognize Egypt and know that Egypt is located in Africa. Fifty percent of the students could not give the most direct route between two cities on a road map. Students appeared to have little difficulty in recognizing the shape of the state of Louisiana (86% correct responses) and a population density map (81% correct responses).

Insert Table 8 about here

Discussion

Overall, the students performed poorly on this test. These prospective teachers will have difficulty teaching geography unless they learn on the job. Fortunately, many of the areas of weakness can be easily corrected. Based on the fact that teachers have been found to have more knowledge than their students, apparently many teachers do teach themselves geographic knowledge.

A study conducted by Breazeale (1985) provides some evidence that teachers learn on the job. Breazeale administered the same world geography test to a group of experienced teachers in the same region of the country as this sample of undergraduates.

The mean for this sample of teachers was 31. This could indicate that teachers learn on the job. However, the difference was slight. Also, the teachers showed the same weaknesses--International Date Line, isthmus, delta, continent of Africa, Lebanon, angle of sun's rays, and savanna. The most difficult content area for the teachers was also landforms.

One area of weakness, place location, will be difficult to correct. Improvement in this area will require a change of attitude toward world events. Teachers must understand the importance of world geography, history, and the other social science disciplines. Based on findings from the Breazeale study, the teachers in her sample have yet to experience this attitudinal change.

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Table 1

Frequency of Correct Responses

Correct Responses	Frequency	Percent	Cumulative Percent
10	1	.8	.8
13	1	.8	1.6
15	2	1.6	3.2
17	4	3.2	6.5
18	5	4.0	10.5
19	5	4.0	14.5
20	8	6.5	21.0
21	3	2.4	23.4
22	4	3.2	26.6
23	6	4.8	31.5
24	6	4.8	36.3
25	6	4.8	41.1
26	7	5.6	46.8
27	5	4.0	50.8
28	7	5.6	56.5
29	9	7.3	63.7
30	2	1.6	65.3
31	4	3.2	68.5
32	10	8.1	76.6
33	8	6.5	83.1
34	6	4.8	87.9
35	6	4.8	92.7
36	3	2.4	95.2
37	1	.8	96.0
38	3	2.4	98.4
39	1	.8	99.2
40	1	.8	100.0

$\bar{X}$=26.9597

SD=6.4004

Table 2
Number of Correct Responses by Item

Item No.	Content	Correct Responses	Percent
1	Direction, Distance, & Elevation	85	68.5
2	Direction, Distance, & Elevation	98	79.0
3	Direction, Distance, & Elevation	112	90.3
4	Basic Definitions	74	59.7
5	Basic Definitions	87	70.2
6	Chronology & Seasonal Change	75	60.5
7	Chronology & Seasonal Change	84	67.7
8	Chronology & Seasonal Change	97	78.2
9	Chronology & Seasonal Change	83	66.9
10	Chronology & Seasonal Change	44	35.5
11	Basic Definitions	92	74.2
12	Map Reading	25	20.2
13	Chronology & Seasonal Change	77	62.1
14	Map Reading	77	62.1
15	Determining Location	110	88.7
16	Determining Location	56	45.2
17	Determining Location	83	66.9
18	Determining Location	63	50.8
19	Determining Location	81	65.3
20	Determining Location	104	83.9
21	Identifying Landforms	25	20.2
22	Identifying Landforms	42	33.9
23	Identifying Landforms	28	22.6
24	Identifying Landforms	72	58.1
25	Distance, Direction, Elevation	72	58.1
26	Map Reading	41	33.1
27	Identifying Landforms	75	60.5
28	Map Reading	93	75.0
29	Map Reading	77	62.1
30	Map Reading	35	28.2
31	Chronology & Seasonal Change	78	62.9
32	Chronology & Seasonal Change	60	48.4
33	Distance, Direction, & Elevation	100	80.6
34	Chronology & Seasonal Change	87	70.2
35	Map Reading	107	86.3
36	Distance, Direction, & Elevation	83	66.9
37	Map Reading	100	80.6
38	Basic Definitions	48	38.7
39	Basic Definitions	66	53.2
40	Chronology & Seasonal Change	68	54.8
41	Chronology & Seasonal Change	94	75.8
42	Chronology & Seasonal Change	51	41.1
43	Map Reading	87	70.2
44	Map Reading	85	68.5
45	Map Reading	62	50.0

Table 3

Percentage of Correct Responses by Content Area: Definitions

No. of Correct Responses	Frequency	Percent	Cumulative Percent
1	15	12.1	12.1
2	32	25.8	37.9
3	31	25.0	62.9
4	35	28.2	91.1
5	11	8.9	100.0
Total	124	100.0	

Table 4

Percentage of Correct Responses by Content Area: Chronology and Seasonal Change

No. of Correct Responses	Frequency	Percent	Cumulative Percent
2	1	.8	.8
3	4	3.2	4.0
4	5	4.0	8.1
5	17	13.7	21.8
6	19	15.3	37.1
7	23	18.5	55.6
8	18	14.5	70.2
9	18	14.5	84.7
10	12	9.7	94.4
11	6	4.8	99.2
12	1	.8	100.0
Total	124	100.0	

Table 5

Percentage of Correct Responses by Content Area: Determining Direction, Distance, and Elevation

No. of Correct Responses	Frequency	Percent	Cumulative Percent
0	2	1.6	1.6
1	1	.8	2.4
2	10	8.1	10.5
3	15	12.1	22.6
4	24	19.4	41.9
5	44	35.5	77.4
6	28	22.6	100.0
Total	124	100.0	

Table 6

Percentage of Correct Responses by Content Area: Determining Location

No. of Correct Responses	Frequency	Percent	Cumulative Percent
0	1	.8	.8
1	4	3.2	4.0
2	16	12.9	16.9
3	29	23.4	40.3
4	22	17.7	58.1
5	26	21.0	79.0
6	26	21.0	100.0
Total	124	100.0	

Table 7

Percentage of Correct Responses by Content Area: Identifying Landforms

No. of Correct Responses	Frequency	Percent	Cumulative Percent
0	10	8.1	8.1
1	37	29.8	37.9
2	44	35.5	73.4
3	19	15.3	88.7
4	10	8.1	96.8
5	4	3.2	100.0
Total	124	100.0	

Table 8

Percentage of Correct Responses by Content Area: Map Reading

No. of Correct Responses	Frequency	Percent	Cumulative Percent
0	1	.8	.8
1	2	1.6	2.4
2	2	1.6	4.0
3	12	9.7	13.7
4	17	13.7	27.4
5	10	8.1	35.5
6	18	14.5	50.0
7	18	14.5	64.5
8	18	14.5	79.0
9	14	11.3	90.3
10	7	5.6	96.0
11	5	4.0	100.0
Total	124	100.0	